

EPIGOMPHUS GIBBEROSUS, A NEW SPECIES FROM PERU, WITH LECTOTYPE DESIGNATIONS FOR THE ELIGIBLE SPECIES OF THE GENUS *EPIGOMPHUS* (ODONATA: GOMPHIDAE)

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ABSTRACT

Epigomphus gibberosus is described after a unique male from Peru (Dept. San Martin, Soritor); the new taxon is very closely related with *E. llama* Calvert. Lectotype designations are made for *E. armatus* Ris, *E. obtusus* Selys, *E. quadracies* Calvert, *E. subobtusus* Selys and *E. tumefactus* Calvert.

INTRODUCTION

Donnelly (1986), in his paper on *Epigomphus westfalli*, justly stated that in the genus *Epigomphus* certain characters used generally in the Gomphidae are of questionable value for the separation of some closely related species and that for these kind of hard to recognize species only the male anal appendages provide the clear distinguishing characters. Calvert (1905) only had the knowledge of an incomplete male syntype of *Epigomphus subobtusus* Selys when he referred his *Epigomphus* males to this species. This syntype is in the British Museum (Natural History) at London and lacks the apical segments of the abdomen with the specifically important anal appendages. Donnelly, trusting Calvert's determination, described *Epigomphus westfalli* despite the fact that his new taxon belongs to the category of hard to recognize species. As caution must be commended in such subtle cases, I have made a search for the complete male syntype of *Epigomphus subobtusus*. This could be located in the Muséum National d'Histoire Naturelle at Paris and it enabled me to make a direct comparison of its male anal appendages with those of *Epigomphus westfalli*.

Another *Epigomphus*, that falls within the category of hard to recognize species, is from the Department of San Martin in northern Peru. This new species is superficially similar to *Epigomphus llama* Calvert described from Chulumani in Bolivia (at about 1000 km distance from the Department San Martin) but on closer inspection of its male, differences are seen in the abdominal extremities

and the penis. The new taxon is here introduced under the name *Epigomphus gibberosus*.

The above mentioned examples of hard to recognize species may emphasize the value of lectotype designations. Of the *Epigomphus* species formerly described on the basis of more than one individual, six require a lectotype. For one species, namely *Epigomphus llama* Calvert, a lectotype has already been designated by the author (Belle, 1970). In the present paper lectotype designations are made for the five other species of *Epigomphus*.

LECTOTYPE DESIGNATIONS

Epigomphus obtusus Selys, 1869

The original series of this species consists of two males and one female in the Selysian collection lodged in the Institut Royal des Sciences Naturelles de Belgique at Brussels. The male here designated as lectotype is a pinned specimen in fairly good condition with the abdomen separately in an envelope attached to the pin. The wings are very dusty and the tips of the right pair of wings are damaged. The envelop is provided with the identification label "*Epigomphus obtusus* ♂" in an unknown handwriting. The old pin labels are "37", "Pebas en h Amaz. Hauxwell" (white label) and "obtusus DS, Peba" (green label). The initials DS apparently refers to the name "De Selys". Added is the yellow pin label "Lectotype Rev. J. Belle, 1987".

The other male is also a pinned specimen in about the same condition with the penile organ

Table 1. Alphabetic list of names of the species of *Epigomphus*, with type locality, type status and type location.

Species	Type locality	Type			
		holo	lecto	sex	location
1. <i>armatus</i> Ris, 1918	"Costa Rica"		X	♂	DEI ¹⁾
2. <i>camelus</i> Calvert, 1905	Carillo, Costa Rica	X		♂	BMNH
3. <i>clavatus</i> Belle, 1980	Arroyo Cuxjá, Guatemala	X		♂	CJ ²⁾
4. <i>crepidus</i> Kennedy, 1936	Victoria Compostela, Mexico	X		♂	UMAA
5. <i>gibberosus</i> spec. nov.	Soritor, Peru	X		♂	UMAA
6. <i>hylaues</i> Ris, 1918	Mato Grosso, Brazil	X		♂	SMF
7. <i>llama</i> Calvert, 1903	Chulumani, Bolivia		X	♂	ANSP
8. <i>obtus</i> Selys, 1869	Pebas, Peru		X	♂	IRSN
9. <i>occipitalis</i> Belle, 1970	Iquitos, Peru	X		♂	SMF
10. <i>paludosus</i> Hagen in Selys, 1854	"Brazil"	X		♀	IRSN
11. <i>paulsoni</i> Belle, 1981	Chiapas, Mexico	X		♂	FSCA
12. <i>pechumani</i> Belle, 1970	"Colombia"	X		♂	CU
13. <i>quadracies</i> Calvert, 1903	San Isidro, Guatemala		X	♂	BMNH
14. <i>subobtus</i> Selys, 1878	San Augustin, Guatemala		X	♂	MNHP
15. <i>subquadrices</i> Kennedy, 1946	Cerro Campana, Panama	X		♂	UMAA
16. <i>subsimilis</i> Calvert, 1920	Turrúcares, Costa Rica	X		♂	ANSP
17. <i>tumefactus</i> Calvert, 1903	Caché, Costa Rica		X	♂	BMNH
18. <i>verticicornus</i> Calvert, 1908	Tuis, Costa Rica	X		♂	ANSP
19. <i>westfalli</i> Donnelly, 1986	Matagalpa, Nicaragua	X		♂	FSCA

¹⁾ The acronyms for the institutions are those proposed by Heppner & Lamas (1982).

²⁾ CJ is the acronym for Prof. Dr G. Jurzitza's personal collection in Karlsruhe.

separately in a cellophane envelope attached to the pin. A fine wooden skewer has been passed through the abdomen to give it additional support. Associated with this specimen are the white pin labels "97", "97" and "Epg. *obtus* S. ♂ Bates type Selys" apparently in Selys' handwriting. The specification "type" cannot be considered equivalent to holotype since Selys did not use the term "type" in a systematic sense (cf. Belle, 1973: 195, 196). There is no label referring to the locality data but from the name "Bates" I infer that the male has been taken in Saint-Paulo (São Paulo de Olivença).

I have seen a good series of *Epigomphus obtus*. Most of the specimens are from the Department of Junín, Peru, and lent to me by the Museum of Michigan, Ann Arbor. Variation in the conformation of the male anal appendages have been noted. The superior anal appendages of some males taper to a lesser degree. The differences in the inferior anal appendage are only found in the tip of the branches and are confined to the angulation of the inner border and the thickness of the apical lobe.

Epigomphus subobtus Selys, 1878

The original series of this species consists of a complete male from San Augustin in Guatemala and an incomplete male taken at the vulcan Irazú in Costa Rica. The former specimen is known to be in the "Muséum de Paris". Investigating the material of the Neotropical Gomphidae in that museum, I found a pinned male of *Epigomphus* with the labels "Ste Augustine" (white label), "188 66" (white label) and the printed museum label "Muséum Paris Coll. R. Martin 1920" (green label) but without any identification label. This male fits exactly Selys' description of *Epigomphus subobtus* and must be regarded as the complete syntype of this species. It is herewith designated as the lectotype. I have added the pin label "*Epigomphus subobtus* Selys, 1878 Lectotype, J. Belle det., 1980".

The lectotype is well preserved. Its abdomen is broken between the segments 3—4 and 4—5 but restored. Dr Jean Legrand of the Muséum National d'Histoire Naturelle, Paris, kindly enlightened me about the sense of the numerals 188 and 66 on the old label: 188 refers to the number of the specimen collected and 66 refers to 1866, the

year of Mr Bocourt's records of the captures in Alta Verapaz, Guatemala. In the absence of any identification label I infer that Calvert has not studied this male from San Agustín.

The other (incomplete) syntype is property of the British Museum (Natural History), London. Kimmins (1969) refrained from designating it as the lectotype since the specimen lacks the terminal segments of the abdomen with the specifically important anal appendages.

Epigomphus subobtusus is reported from Mexico to Costa Rica. In my collection (now property of the Rijksmuseum van Natuurlijke Historie at Leiden), all males previously referred to this species by the diverse workers are conspecific with the lectotype. But variations have been noted in the colouring and extent of the pale markings, in the shape of the dorsal surface of the occiput, and in the configuration of the male anal appendages. The extremities are linked by miscellaneous intermediate forms. A male from Guatemala (taken in Mina San Vincente, Dept. of Chiquimula) differs from the lectotype in the following particulars: hind wing 37 mm; in lectotype, 35 mm. Superior anal appendages, in profile, broader at the tip than in the lectotype (figs. 1 and 2). Pale dorsal band of frons leaden(grey); in lectotype, green. Pale spots on labrum smaller than in lectotype.

The nearest relative of this species is *Epigomphus westfalli* Donnelly, 1986. Dr Donnelly kindly provided me with a male of his species taken along with the other specimens of the type series (fig. 5). A direct comparison of this male with the lectotype of *Epigomphus subobtusus* shows the differences in the configuration of the anal appendages as already stated by Donnelly (1986: 37). But differences are also found in the shape of the wings (figs. 3 and 4). *Epigomphus westfalli* has larger and relatively more slender wings than *Epigomphus subobtusus*. In the latter species, the ratio between the length and the greatest width of the wing (intrinsic length) is 4.4 for the fore wing and 3.6 for the hind wing; in *Epigomphus westfalli*, these numerals are 4.8 and 3.8, respectively.

Epigomphus quadracies Calvert, 1903

Calvert, when publishing *Epigomphus quadracies* and *Epigomphus tumefactus* in 1903, did not specify types. The type-labels (cf. Kimmins, 1969) were added in 1905, two years after the description of the species. As the original series of either species consists of more than one male, the specimens

labelled "type" cannot be considered equivalent to the holotype as suggested by Kimmins (1969: 289).

The original series of *Epigomphus quadracies* consists of two males and one female. The chosen lectotype is the male from San Isidro, Guatemala, i.e. the male stated in Kimmins' paper of 1969. It is a pinned specimen in good condition. I have replaced its pin label "Holotype" with the printed museum label "Lectotype" and added the label "Lectotype Rev. J. Belle, 1987".

Epigomphus tumefactus Calvert, 1903

Calvert (1903) listed two males collected by H. Rogers in Caché, Costa Rica. The male mentioned by Kimmins in his paper of 1969 (page 298) is here designated as the lectotype. It is also a pinned specimen in good condition. The museum label "Holotype" has been removed and the museum label "Lectotype" and the label "Lectotype Rev. J. Belle, 1987" have been added to the pin of the specimen.

Epigomphus armatus Ris, 1918

According to Ris (1918) the original material of this species, consisting of two males and one female taken in Costa Rica, is property of the Deutsches Entomologisches Museum at Berlin-Dahlem (now the Institut für Pflanzenschutzforschung, Eberswalde Finow). The male illustrated in the original description of the species (Ris' figs. 90—93) is here designated as the lectotype. It is a pinned specimen in fairly good condition but it lacks the left superior anal appendage. This was apparently removed by Ris in order to study the inferior appendage and not re-attached to the specimen. The pin labels are "C. Rica" (blue label), "*Epigomphus* nov. spec. a. Det. Dr. F. Ris" (white label), "Ris. det." (white label), "*Epigomphus armatus* Ris, Kordill. 1918 p. 148 — Type" (white label, Ris' handwriting), "Syntypus" (red museum label), "DEI Eberswalde" (white museum label). I have added the yellow pin label "Lectotype Rev. J. Belle, 1988".

The other male has the same labels but the specification "Type" is lacking. The female (fig. 6) has the specification "Allotype", also in Ris' hand.

The specimens of the original series were kindly lent to me for study by the authorities of the Institut für Pflanzenschutzforschung. When the dragonflies came at hand, they proved to be very seriously damaged, probably because of the use of material not suitable for pinning the fragile insects.

I have searched for the pieces belonging to the male with the specification "Type" and I was able to restore it fairly well. The pieces of the other male were stored in a $3\frac{1}{2} \times 5$ inch cellophane envelope. The pieces of the female were put in two triangular cellophane envelopes and attached to the pin of the damaged specimen.

Epigomphus gibberosus spec. nov.
(fig. 7—10)

Four features distinguish the male of this species from that of its closest relative *Epigomphus llama*.

(1) The dorsal hump of the tenth abdominal segment is also developed on the basal portion of the segment (fig. 8); it is developed only on the middle of the segment in *Epigomphus llama* (cf. Belle, 1970: fig. 14).

(2) The apex of each superior anal appendage is bifid, the inner (obtus) point being better developed than the outer one (fig. 7); in *Epigomphus llama*, the superior anal appendage terminates in a point which is curved slightly outward (cf. Belle, 1970: fig. 15).

(3) The inferior anal appendage, in profile view, has the superior (acute) tooth of the branch remote from the base of the inferior appendage less than twice the length of the branch beyond this tooth (fig. 8); the distance is more than twice the length of the branch beyond the tooth in *Epigomphus llama* (cf. Belle, 1970: fig. 14).

(4) The middle segment of the penis (Fraser, 1940: 544) is produced apically and bifid, the divisions being ear-shaped (fig. 10); the divisions are simply obtuse in *Epigomphus llama* (fig. 11).

Material. — Peru: Dept. of San Martin, Soritor (900 m; vicinity of Rioja), 1 ♂ (holotype), 15 October 1936, Felix Woytkowski. The holotype is deposited in the Museum of Michigan, Ann Arbor, Michigan.

Description of the male holotype.

Measurements: total length 52 mm; abdomen 40 mm (including anal appendages 2.9 mm); hind wing 34.5 mm; greatest width of hind wing 8.5 mm; costal edge of prerotostigma in fore wing 3.5 mm, in hind-wing 3.6 mm.

Head: face brown with large green basal spot on either lateral side of labrum, green mandibles (except for the black tips) and green genae. Superior surface of frons largely green, medially interrupted by a triangular brown spot. Vertex and occiput brown.

Prothorax: brown with green spot on middorsal portion and lateral margins of middle lobe.

Pterothorax: colour pattern done in brown and

green, and similar to that of *Epigomphus llama* with a green dorsal antehumeral spot instead of a complete green antehumeral stripe immediately in front of humeral suture.

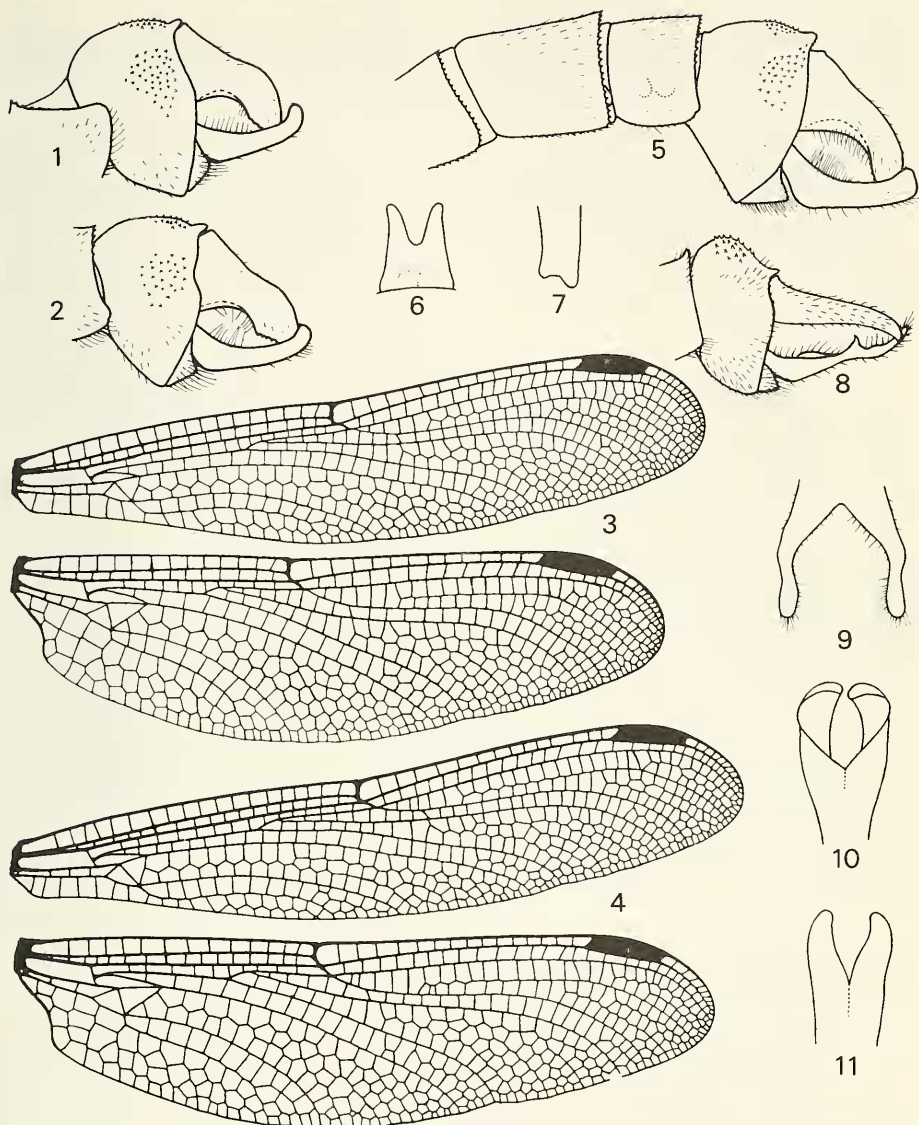
Legs: femora yellowish brown, becoming darker toward knees on posterior side of third femur, being greyish brown on anterior side of second femur and inner side of first femur. Tibiae, tarsi and claws very dark brown. No trace of a lamina tibialis on first pair of tibiae. Third pair of legs with the spines on outer row of tibiae and first two joints of tarsi modified.

Abdomen: predominantly dark brown. Sides of segments 1 and 2 marked with yellow and green. Sides of 3 and 4 with longitudinal yellow band interrupted by dark brown at submedian transverse carina. Sides of 5 and 6 with yellow basal spots. Dorsum of 7 yellow from base to apex. Dorsum of 8 and 9 with reddish brown spots on apical half. Segment 10 reddish brown on top of hump and on either lateral side of this hump. Segment 2 with a yellow middorsal stripe; this stripe becoming very narrow on 3 and 4. Anal appendages dark brown and shaped as shown in accompanying figures (figs. 7—9).

Wings: slightly tinged brown. Venation blackish brown, including frontal margin of costa. Pterostigma brown. Basal subcostal cross-vein present. Nodal index 14:16—16:13/13:13—14:12. Second primary antenodal cross-vein the sixth in fore wings, the seventh in hind wings. Intermedian cross-veins 5—5/3—3 in fore and hind wings, respectively. Supratriangle in right hind wing two-celled, in other wings one-celled. Discoidal triangles and subtriangles also free from cross-veins. Three (fore wings) and two (hind wings) cubito-anal cross-veins in addition to inner side of subtriangle. Hind wings with five paranal cells, three postanal cells and three rows of cells behind Cu2. Intrinsic length of hind wing 4 (in ♂ of *Epigomphus llama* 3.5).

The female of *Epigomphus gibberosus* is unknown. The collector Felix Woytkowski furnished along with the male a brief field note concerning its behaviour and occurrence: "Taken over an open brook in the jungle. Is rare here".

Remark. — In the collection of the Museum of Michigan, Ann Arbor, there are a male and a female of *Epigomphus* from Peru that may be of some interest. The specimens have been captured in August 1940 by Pedro Paprzycki at Satipo in the Department of Junin, a locality about midway between Bolivia and the Department of San



Figs. 1—3. *Epigomphus subobtusatus* Selys: 1, left profile view of tenth abdominal segment and anal appendages, ♂ lectotype; 2, the same, ♂ from Mina San Vincente, Guatemala; 3, right pair of wings, ♂ lectotype. Figs. 4, 5. *Epigomphus westfalli* Donnelly. ♂ from type locality in Guatemala: 4, right pair of wings; 5, apical segments of abdomen and anal appendages, left profile view. Fig. 6. *Epigomphus armatus* Ris. Ventral view of vulvar lamina of ♀ labelled "Allotype" by Ris. Figs. 7—10. *Epigomphus gibberosus* spec. nov. ♂ holotype: 7, apex of left superior anal appendage, caudal view; 8, tenth abdominal segment and anal appendages, left profile view; 9, inferior anal appendage, ventral view; 10, apex of middle segment of penis, ventral view. Fig. 11. *Epigomphus llama* Calvert. Apex of middle segment of penis, ventral view.

Martin. The female is a fully mature specimen that can well be studied despite the fact that the apical segments of its abdomen are flattened. The female is conspecific with *Epigomphus llama*; the minor differences with the female of this species seem to me without value on the specific level. The male is very teneral and flattened. Compared with the male of *Epigomphus llama* from Bolivia, no clear differences are found in the conformation of the superior anal appendages and the third penial segment, but it would appear that the (badly flattened) dorsal hump of the tenth abdominal segment and the (shrivelled and partly broken) inferior anal appendage are identical with those of *Epigomphus gibberosus*.

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